Monitoring all Hydrologic Compartments in a Small Agricultural Watershed in Central California

Charles R. Kratzer, Joseph L. Domagalski, Steven P. Phillips, Peter D. Dileanis, Celia Zamora, and Michael S. Majewski

U.S. Geological Survey, Placer Hall, 6000 J Street, Sacramento, California 95819-6129

Biographical Sketches of Authors

Charles Kratzer is the study unit chief for the San Joaquin-Tulare Basins study unit of the USGS National Water Quality Assessment (NAWQA) Program. In addition to his NAWQA responsibilities, he has led several monitoring efforts related to pesticide and nutrient transport and stream travel times. Joseph Domagalski is the study unit chief for the Sacramento River Basin NAWQA and is the staff scientist for this overall study and the specialist for the vadose zone compartment. Steven Phillips is a groundwater hydrologist and is the specialist for the groundwater flowpath processes and modeling portions of this study. Peter Dileanis is the surface-water hydrologist for both the San Joaquin and Sacramento NAWQA study units and is the specialist for the surface runoff compartment. Celia Zamora is a USGS hydrologist and a graduate student in Hydrogeology at California State University at Sacramento. Her thesis topic is the groundwater and surface water interaction compartment of this study. Michael Majewski is a research chemist involved in several studies of atmospheric deposition and transport and is the specialist for the atmosphere compartment.

Abstract

The San Joaquin Valley, California, study area of the National Water Quality Assessment Program is one of five areas participating in an intensive, nationwide study of the sources, transport, and fate of agricultural chemicals. A goal of these studies is to estimate a mass balance for water and chemicals in a small agricultural watershed. To achieve this goal, all compartments of the hydrologic cycle are being instrumented and monitored. These compartments include the atmosphere, surface runoff, vadose zone, and groundwater. In addition, groundwater processes along a flowpath, and interactions between groundwater and surface water at the toe of the flowpath are being monitored.

The San Joaquin site is located within the Merced River Basin on the east side of the valley. Atmospheric sampling will include rainfall collectors at four sites, weather stations at three sites, and evapotranspiration measurements at two sites. Monitoring of surface runoff will include sampling a culvert that collects runoff from an almond orchard and sampling the receiving stream at three sites. Dye studies will be done to determine travel times in the stream. The vadose zone will be monitored with pan and suction lysimeters to collect water samples below the root zone, time domain reflectometry sensors to measure moisture content, and heat dissipation probes to measure pressure heads. Groundwater levels, temperature, and chemistry will be measured at three monitoring-well clusters along a flowpath and at one or two clusters off the flowpath. The interaction of groundwater and surface water will be monitored using head, temperature, and water-quality measurements in monitoring-well clusters at multiple depths below the streambed and its banks and in seepage meters in the streambed.